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A new species of *Ischiodon* Sack (Diptera, Syrphidae) from Madagascar

Ximo Mengual[1]

1 *Zoologisches Forschungsmuseum Alexander Koenig, Leibniz-Institut für Biodiversität der Tiere, Adenauerallee 160, D-53113 Bonn, Germany*

Corresponding author: *Ximo Mengual* (x.mengual@leibniz-zfmk.de)

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Abstract

The flower fly genus *Ischiodon* Sack (Diptera, Syrphidae) is revised and a new species, *Ischiodon astales* **sp. n.**, is described from Madagascar. Additionally, a lectotype for *Ischiodon aegyptius* is designated and the first records of *Ischiodon scutellaris* for the Arabian Peninsula are reported. Diagnoses, illustrations, synonymies and distributional data are given for all described species, as well as an identification key to all known species.

Keywords

identification key, flower flies, hoverflies, *Ischiodon astales*, Afrotropical Region

Introduction

The genus *Ischiodon* Sack, 1913 (Diptera, Syrphidae) is a small, but very characteristic genus, with a very broad distribution and a taxonomic history full of confusion and synonyms (Vockeroth 1969). The genus occurs in southern Europe, the Mediterranean basin, throughout all of the African continent, eastwards to India, China, Japan, southeast Asia, Australia and some Pacific islands (Huang and Cheng 2012, Thompson 2013, Speight 2017). *Ischiodon* species have been originally described in eight different genera, a fact that may indicate the morphological resemblance of these

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species with other syrphid taxa and the broad genus concepts of previous authors: i.e. *Musca* Linnaeus, 1758, *Syrphus* Fabricius, 1775, *Scaeva* Fabricius, 1805, *Sphaerophoria* Le Peletier & Serville, 1828, *Xanthogramma* Schiner, 1860, *Epistrophe* Walker, 1852, *Melithreptus* Loew, 1840 (a junior primary homonym of *Sphaerophoria*), and *Ischiodon* (Thompson 2013). On the other hand, a junior synonym of *Sphaerophoria rueppellii* (Wiedemann, 1830) was described as *Ischiodon libycum* Nayar, 1978.

The confusion of *Ischiodon* as a valid genus is due to its superficial morphological resemblance with the genus *Simosyrphus* Bigot, 1882. This confusion started when Bezzi (1912:72) synonymised *Syrphus grandicornis* Macquart, 1842 (now *Simosyrphus grandicornis*) under *Ischiodon scutellaris* (Fabricius, 1805). Species of both genera have been previously placed under one another several times (Mengual 2015, see below under each species), despite some important differences in the male genitalia (Vockeroth 1969). The generic key by Vockeroth (1969) can be used to identify both genera. A synonymy of both genera was proposed by Láska et al. (2006) based on larval and pupal morphology, supported by a molecular study of a very limited taxon sampling using only part of the gene *cytochrome c oxidase subunit 1* (COI). More recently, Mengual et al. (2018) resolved both genera as related to *Scaeva* but the genus *Pseudodoros* as sister group of *Ischiodon*; thus, current evidence supports the generic rank of *Ischiodon* and *Simosyrphus*.

Ischiodon comprises three species with quite distinct distributions: *I. feae* (Bezzi, 1912) is endemic of the Cape Verde Islands, *I. aegyptius* (Wiedemann, 1830) is mainly present in Africa and southern Europe and *I. scutellaris* (Fabricius, 1805) occurs in the Oriental and Australasian Regions. Larvae of *I. aegyptius* and *I. scutellaris* have been reported feeding on aphids (Hemiptera, Aphididae) mostly, but there are a few records on thrips (Thysanoptera), whiteflies (Hemiptera, Aleyrodidae) and caterpillars (Lepidoptera) (Rojo et al. 2003).

The aim of this study is to revise the genus *Ischiodon* and describe a new species from Madagascar, as well as to provide an identification key for all known species of this genus. In addition, a lectotype is designated for *Syrphus aegyptius* Wiedemann, 1830 and the first records of *I. scutellaris* from the UAE are reported.

Material and methods

Differential diagnoses, synonymies and distributions are given for all studied species. The new species is described in full, with terminology following Thompson (1999) and Cumming and Wood (2009). The abbreviations used for collections follow the standard of the *Systema Dipterorum* (Thompson 2013) and their equivalents are given below:

CAS	California Academy of Sciences, San Francisco, USA.
CSCA	California State Collection of Arthropods, Sacramento, USA.
MSNG	Museo Civico di Storia Naturale 'Giacomo Doria', Genova, Italy.
MZH	Finnish Museum of Natural History, Helsinki, Finland.

SMF Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany.
ZFMK Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany.
ZMUC University of Copenhagen, Zoological Museum, Copenhagen, Denmark.

In the description of type labels, the contents of each label are enclosed within double quotation marks (“ ”), italics denote handwriting and the individual lines of data are separated by a double forward slash (//). At the end of each record, between square brackets ([ ]) and separated by a comma, the number of specimens and sex, the holding institution and the unique identifier or number are given.

All measurements are in millimetres and were taken using a reticule in a Leica M165 C microscope. Photographs were composed using the software Zerene Stacker 1.04 (Richland, Washington, USA), based on images of pinned specimens taken with a Canon EOS 7D mounted on a P–51 Cam-Lift (Dun Inc., VA, USA) and with the help of Adobe Lightroom (version 5.6). Simple-Mappr (Shorthouse 2010) was used to create Figure 4. Body length was measured from the anterior oral margin to the posterior end of the abdomen, in lateral view. Wing length was measured from the wing tip to the basicosta.

Results

Genus *Ischiodon* Sack, 1913

Type-species. *Ischiodon trochanterica* Sack, 1913, by monotypy; junior synonym of *Scaeva scutellaris* Fabricius, 1805.

Differential diagnosis (adapted from Vockeroth 1969). Small to medium-sized, rather slender species with yellow-margined mesonotum, broad yellow fasciae on abdomen and very large and prominent male genitalia. Face yellow, with or without medial black vitta; eye bare; basoflagellomere large, twice as long as broad, tapering slightly to an acutely rounded apex. Mesonotum shining black with broad, well-defined, pale to bright yellow lateral vitta extending to postalar callus. Scutellum yellow, usually obscurely brownish on disc. Pleuron mostly shining black, except posterior anepisternum yellow on posterior half and katepisternum with a dorsal yellow macula. Dorsal and ventral katepisternal pile patches broadly separated posteriorly. Metasternum bare. Wing with microtrichia greatly reduced, absent from most of basal half and elsewhere very sparse and irregularly scattered. Abdomen elongate, parallel-sided or very narrowly oval, rather flattened, with a strong margin from middle of tergite 2 to the end of tergite 5. Tergite 2 with a pair of separate or narrowly confluent pale maculae; tergites 3 and 4 each with a rather broad, slightly arcuate yellow fascia separated from the base of each tergite. Very often, the black abdominal areas become reddish or yellow towards the abdominal apex, so the pattern is indistinct.

In males of *I. aegyptius* and *I. scutellaris*, the ventral surface of the metatrochanter has a slender or moderately stout, cylindrical, apically acute process (calcar) of varying length. In males of *I. aegyptius* and *I. feae*, the inner (mesial) claw of the protarsus has a dorsal preapical projection, or flange, which gives the claw a truncated appearance (Fig. 5F).

Etymology. *Ischiodon* is derived from the neuter adjective *ischion*, from the Greek *ischion* meaning "hip, coxa" (Brown 1956: 411) and the masculine Greek noun *odous* (*odon*), *odontos*, meaning tooth (Brown 1956: 807). Thus, *Ischiodon* refers to the calcar or spur that some species have in the metatrochanter.

Several authors (including the present author) used the species epithet of *Ischiodon aegyptium* in neuter form. *Ischidon* must be treated as a masculine gender and all species names must follow this gender except nouns in apposition. Thus, the correct species epithet is *Ischiodon aegyptius*.

Ischiodon aegyptius (Wiedemann, 1830)

Figure 1

Musca nigra Forsskål, 1775: xxiv. Type-locality: Egypt, Arabia. Type material most likely lost (not found in the digitised type collection of the ZMUC).

Syrphus aegyptius Wiedemann, 1830: 133. Type-locality: Eritrea and Ethiopia, as Abyssinia, here restricted. Lectotype ♂, SMF, here designated.

Syrphus senegalensis Guérin-Méneville, 1832: pl. 99. [Description in 1844: 545]. Type-locality: Senegal.

Sphaerophoria annulipes Macquart, 1842: 103. Type-locality: Egypt.

Syrphus longicornis Macquart, 1842: 154. Type-locality: South Africa.

Syrphus natalensis Macquart, 1846: 262 (134). Type-locality: South Africa, 'Port Natal'.

Syrphus felix Walker, 1852: 229. Type-locality: Canary Is.

Syrphus brachypterus Thomson, 1869: 496. Type-locality: Madeira.

Sphaerophoria pyrrura Bigot, 1884: 99. Type-locality: Senegal.

Sphaerophoria borbonica Bigot, 1884: 100. Type-locality: Réunion Is.

Xanthogramma catalonicum Andreu, 1926: 110. Type-locality: Spain: Prov. Barcelona, Moya.

Differential diagnosis. Very common species in the Afrotropical region with yellow markings on abdomen reaching the lateral margins (Fig. 1A, C). Males of *I. aegyptius* have metatrochanters with a long calcar (Fig. 1E) (short calcar in *I. scutellaris*) and the claws of the fore leg are asymmetrical (as in Fig. 5F) (males of *I. feae* also have asymmetrical claws but they do not have a calcar on the metatrochanters). The male genitalia are quite unique with a trilobed surstyli (Fig. 1F). Females are very difficult to distinguish from females of *I. scutellaris* as the pattern of tergite 2, very often used to distinguish them (Sack 1932, Huang and Cheng 2012, Speight and Sarthou 2017), is variable. At this moment, conspecific males, DNA barcodes and/or collecting locality may help to distinguish them.

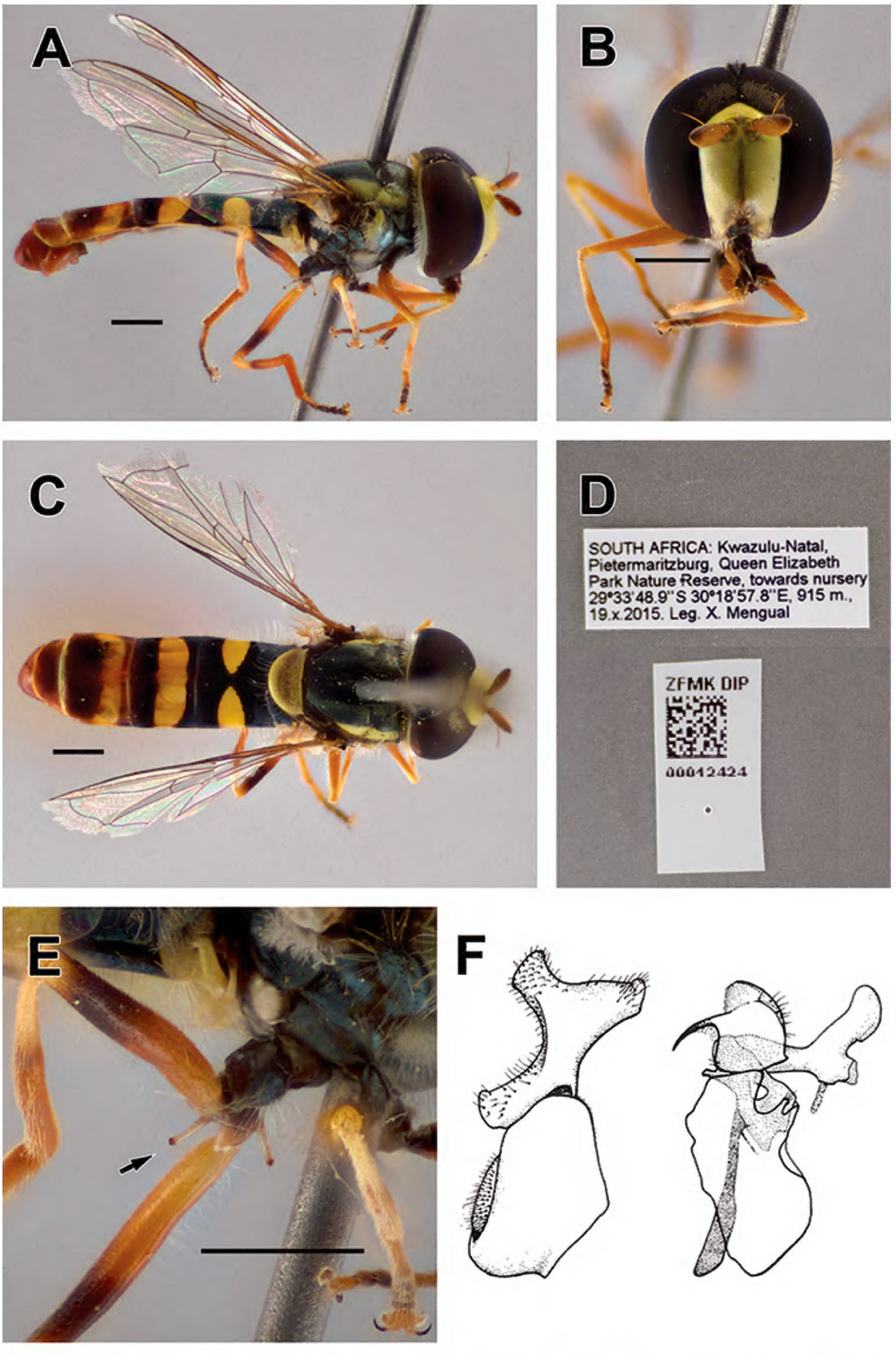

Figure 1. *Ischiodon aegyptius* (Wiedemann), male ZFMK-DIP-00012424: **A** Habitus, lateral view **B** Frontal view **C** Habitus, dorsal view **D** Labels **E** Metacoxa, metatrochanter and metafemur, lateral view **F** Male genitalia, lateral view (from Claussen and Barkemeyer 1987). Scale bars: 1 mm.

Geographical distribution. African continent and archipelagos, southern Europe, Israel and Arabian Peninsula.

Type-locality. Wiedemann (1830) studied an unknown number of specimens from Egypt and Nubia (currently divided into Egypt and Sudan). All the syntypes present in the ZMF collection, collected by Rüppell with original handwritten labels, were collected from Abyssinia, a historical region in northern Ethiopia and southern Eritrea, although sometimes east Sudan is also considered part of this kingdom. Thus, the type-locality is here restricted to Eritrea and Ethiopia based on the lectotype designation.

Material examined. More than 300 specimens from UAE, Israel, Cyprus, Morocco, Canary Islands, Madagascar, Kenya, The Gambia, Central African Republic, Zimbabwe and South Africa.

Remarks. Amongst the syntypes, deposited at the Senckenberg Forschungsinstitut und Naturmuseum (SMF, Frankfurt am Main, Germany), there is a pinned male labelled "Abyssinia // D^{r}.. Rüppell." "289" [green] "*Ischiodon* // *aegyptius* Wd" "*Lecto-* // Typus" [red] "Dipt. // 300" [reverse] "LECTOTYPE // *Ischiodon* // *aegyptius* // det. X. Mengual 2017" [red, second and third lines handwritten]. This specimen is here designated lectotype to fix and ensure the universal and consistent interpretation of the name. The other syntypes, a male and a female without head, have been labelled as paralectotypes: "Abyssinia // D^{r}.. Rüppell." "*Ischiodon* // *aegyptius* Wd" "*Para-* // typoid" [red] "Dipt. // 300" [reverse] "PARALECTOTYPE // *Ischiodon* // *aegyptius* // det. X. Mengual 2017" [yellow].

Some authors (Huang et al. 1996, Huang and Cheng 2012) reported specimens identified as *I. aegyptius* from China, with a complete overlapping distribution inside this country with *I. scutellaris* (see Huang and Cheng 2012). In the author's opinion, only *I. scutellaris* occurs in China and these specimens are misidentifications when the pattern of the tergite 2 is used in females for identification. These works (Huang et al. 1996, Huang and Cheng 2012) do not specify if there are males of *I. aegyptius* amongst the studied material, which could be used to corroborate the author's opinion.

Ischiodon astales sp. n.

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Figures 2, 3A–D, 4

Differential diagnosis. Females and males of this new species do not have a calcar on the metatrochanter and they are easy to distinguish from other species since the two broad, yellow maculae on tergite 2 do not reach the lateral margins (Figs 2A, C, 3A, C). Moreover, males of *I. astales* sp. n. have symmetrical claws on the fore leg, the same as males of *I. scutellaris*.

Description. *Male*: *Head* (Fig. 2A, B): Face with distinct facial tubercle, entirely yellow, yellow pilose; gena yellow with two small black macula at eye margin; lunule yellow; frons yellow, yellow pilose; vertical triangle black; antenna yellow, black pilose, basoflagellomere orange, darker dorsally; arista orange-yellow, bare; eye bare; occiput

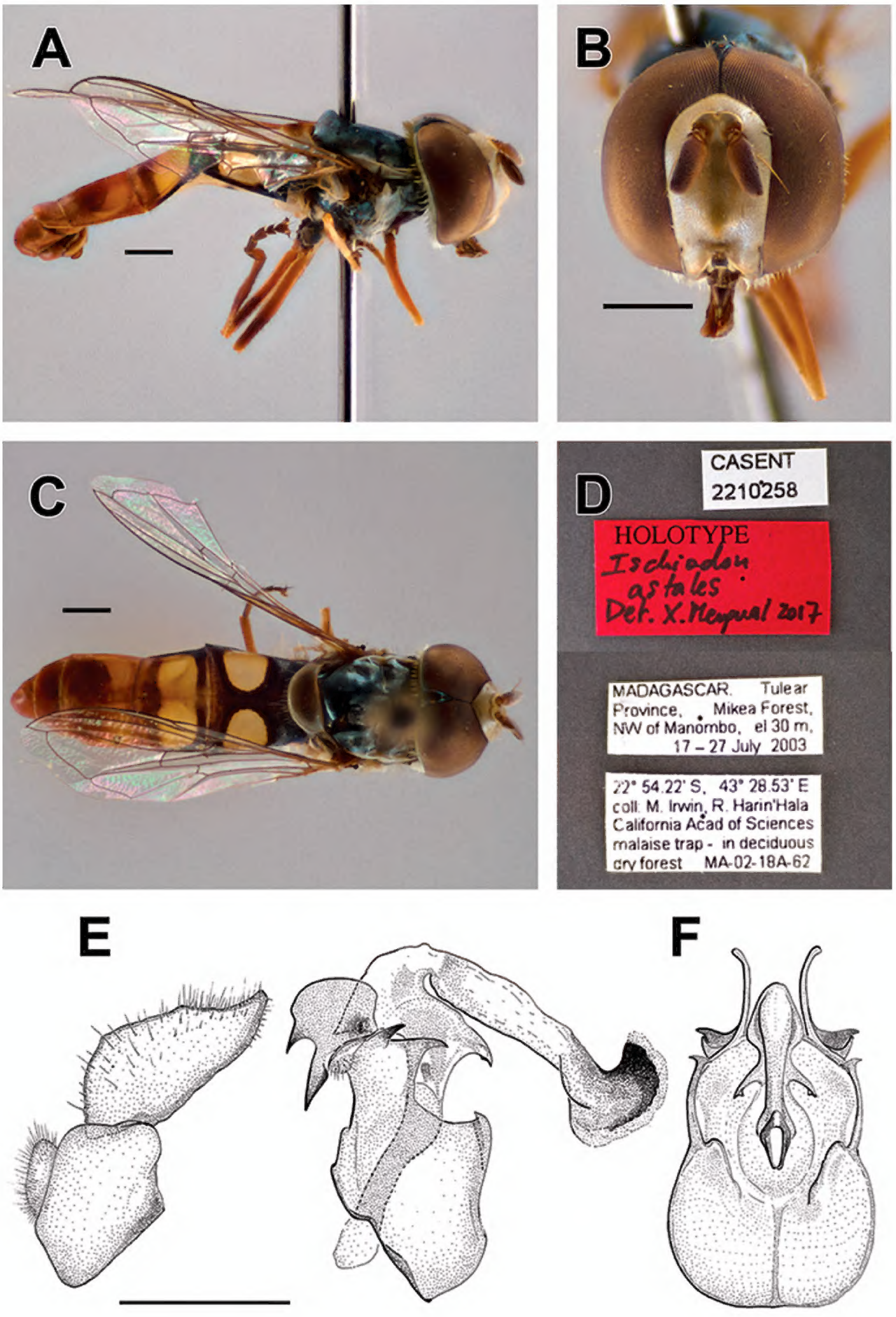

Figure 2. *Ischiodon astales* sp. n., male holotype CASENT 2210258: **A** Habitus, lateral view **B** Frontal view **C** Habitus, dorsal view **D** Labels **E** Male genitalia, lateral view **F** Hypandrium, ventral view. Scale bars: 1 mm.

black, white pollinose and white pilose on ventral 1/2, yellow pollinose and yellow pilose on dorsal 1/2.

Thorax (Fig. 2A, C): Scutum shiny black, with long yellow pile; postpronotum paler, brownish, bare; notopleuron and supra-alar area yellow; postalar callus darker, brownish; scutellum yellow with medial area brownish, yellow pilose, subscutellar fringe yellow. Pleuron black, except posterior anepisternum yellow on posterior 1/2 and katepisternum with a dorsal yellow macula, yellow pilose; katepisternal pile patches separated; metaepisternum bare; metasternum bare; postmetacoxal bridge incomplete; calypter yellow, yellow pilose; plumula long, pale; halter pedicel and capitulum yellow; posterior spiracular fringes yellow. *Wing*: hyaline, bare on basal 1/2 and with sparse and irregularly scattered microtrichia on apical 1/2; alula mostly bare, with a few microtrichia posteriorly. *Legs*: fore and mid legs yellow with femora slightly more orange, coxae black and basal 1/2 of trochanters dark, entirely yellow pilose; hind leg with black coxae and basal part of trochanter dark; yellow metafemur with an almost imperceptible brown area on the apical 1/2, and metatibia slightly darker (dark yellow) on apical 1/2, black and yellow pilose.

Abdomen (Fig. 2A, C): Parallel-sided, with lateral margin from apical 1/2 of tergite 2 to tergite 5. Tergite 1 black, except yellow on lateral margins, yellow pilose; tergite 2 black, paler medially on posterior margin, with two large, rounded yellow maculae that do not reach lateral margins, yellow pilose, with short black pile on posterior margin; tergite 3 black on basal 1/2 becoming orange or brownish on posterior 1/2, with a medial yellow fascia that does not reach the lateral margins, with scattered, short, black pile; tergite 4 brownish-orange with a medial yellow fascia, black pilose except on the yellow fascia; tergite 5 brownish-orange, black pilose. Sternite 1 yellow; sternite 2 yellow with a medial, round, black macula; sterna 3 and 4 yellow becoming darker (brownish orange) towards genitalia; all sterna with yellow pile. Male genitalia: large, brownish-orange, as in Fig. 2E, F.

Female: Similar to male except for normal sexual dimorphism and as follows: frons black on dorsal 1/3, yellow on ventral 2/3 with a variable medial brownish orange vitta.

Variation: Due to the small number of specimens, one must expect variability in the coloration of the abdomen, legs and female frons, as in other *Ischiodon* species.

Length (N=4): Body, 10.0 mm (9.0–12.0 mm); wing, 7.7 mm (7.5–8.0 mm).

Geographical distribution. Species known from the southern regions of Atsimo-Andrefana and Anosy, part of the former Toliara Province, Madagascar (Fig. 4; see Suppl. material 1: Table S1).

Etymology. The specific epithet is derived from the Greek *astales* meaning unarmed, unclad (Brown 1956: 122). Species epithet is to be treated as an adjective.

Type locality. Madagascar: Atsimo-Andrefana Region, Mikea forest, NW of Manombo, 22°54.22'S, 43°28.53'E.

Material examined. Type material. *Holotype*, male, pinned with genitalia in microvial, deposited in the CAS and labelled: "MADAGASCAR, Tulear // Province, Mikea Forest, // NW of Manombo, el 30 m, // 17 – 27 July 2003" "22°54.22'S, 43°28.53'E // coll: M. Irwin, R. Harin'Hala // California Acad of Sciencies // malaise trap - in deciduous //

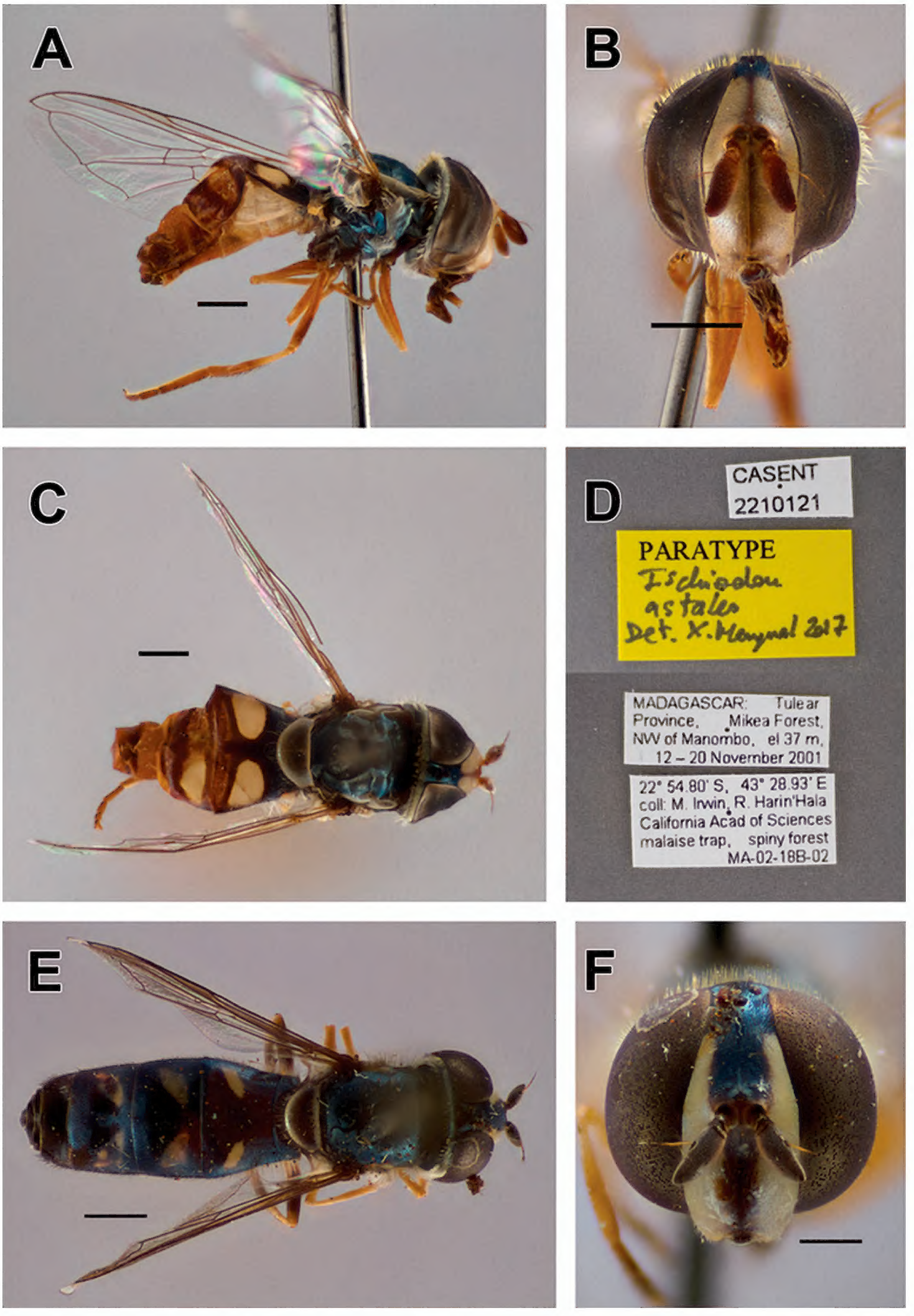

Figure 3. *Ischiodon astales* sp. n., female paratype CASENT 2210121: **A** Habitus, lateral view **B** Frontal view **C** Habitus, dorsal view **D** Labels. *Ischiodon feae* (Bezzi), female GJ.1985: **E** Habitus, dorsal view **F** Frontal view. Scale bars: 1 mm (**A–C, E**); 0.5 mm (**F**).

Figure 4. Known distribution of *Ischiodon astales* sp. n.

dry forest MA-02-18A-62" "CASENT // 2210258" "HOLOTYPE // *Ischiodon* // *astales* // *Det. X. Mengual 2017*" [red]. *Paratypes*: Madagascar: Atsimo-Andrefana Region, Mikea Forest, NW of Manombo, 37 m., -22.91333°, 43.48217°, 12–20.xi.2001, M. Irwin, R. Harin'Hala [1♀, ZFMK; CASENT 2210121]; Atsimo-Andrefana Region, Zombitse-Vohibasia National Park, near ANGAP Office, 840 m., -22.8865°, 44.69217°, 31.x–16.xi.2002, R. Harin'Hala [1♀, CSCA; ZFMK-DIP-00026782]; Anosy Region, Berenty Special Reserve, 8 km NW Amboasary, 85 m., -25.00667°, 46.30333°, 26.x–2.xi.2002, M. Irwin, F. Parker, R. Harin'Hala [1♀, ZFMK; CASENT 2210162]; Anosy Region, Andohahela National Park, Ihazofotsy Parcelle III, 80 m., -24.83083°, 46.53617°, 23–30.xi.2003, M. Irwin, F. Parker, R. Harin'Hala [1♀, CAS; CASENT 2210150].

Remarks. All specimens of this new species were collected using Malaise traps in different habitats. The male holotype was collected in a deciduous dry forest, while females CASENT 2210150 and CASENT 2210121 were collected in dry spiny forests and the female CASENT 2210162 in a gallery forest. On the other hand, the female ZFMK-DIP-00026782 was collected at a relative high altitude compared with the other specimens.

Ischiodon feae (Bezzi, 1912)

Figures 3E, F, 5

Syrphus feae Bezzi, 1912: 407. Type, MSNG. Type-locality: Cape Verde Is.

Differential diagnosis. Very distinct *Ischiodon* species with a darker overall coloration (Figs 3E, 5C), face yellow with a medial black vitta (Figs 3F, 5B) and terga 2–4 with two small, oblique yellow maculae not reaching the lateral margins (Fig. 5A, C). Males of *I. feae* have fore legs with asymmetrical claws and metatrochanter without calcar.

Geographical distribution. Only known from Cape Verde.

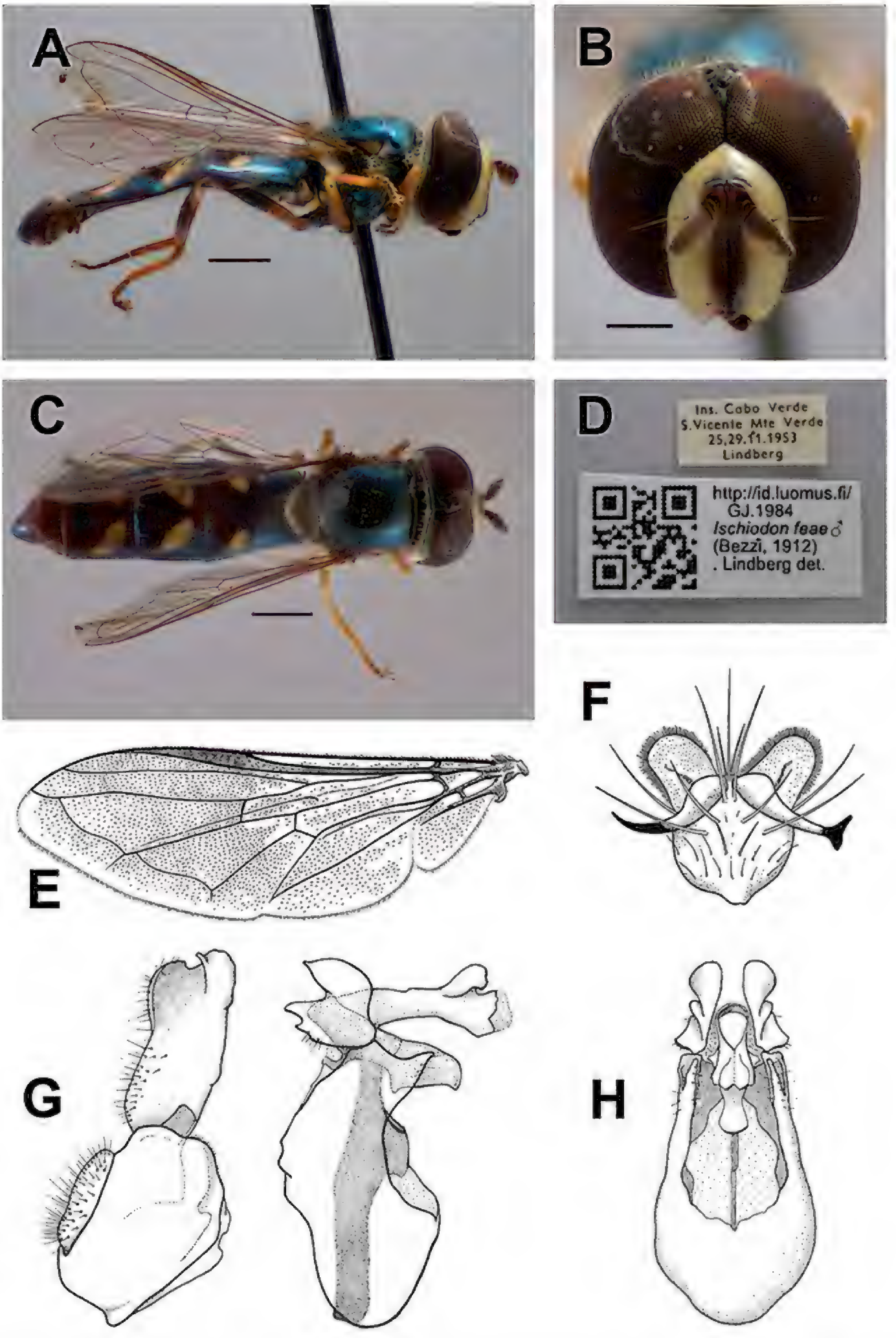

Figure 5. *Ischiodon feae* (Bezzi), male http://id.luomus.fi/GJ.1984: **A** Habitus, lateral view **B** Frontal view **C** Habitus, dorsal view **D** Labels **E** Wing **F** Acropod and fifth tarsomere of the fore leg, dorsal view **G** Male genitalia, lateral view **H** Hypandrium, ventral view. (**E–H** from Claussen and Barkemeyer 1987). Scale bars: 1 mm.

Material examined. Cape Verde: São Vicente Is., Monte Verde, 25–29.xi.1953, Lindberg [1♂, MZH; http://id.luomus.fi/GJ.1984]; São Vicente Is., Ribeira de Julião, 26.xi–2.xii.1953, Lindberg [1♀, MZH; http://id.luomus.fi/GJ.1985]; Santa Luzia Is., Agua Doce, 3.xii.1953, Lindberg [2♀, MZH; http://id.luomus.fi/GJ.1986, http://id.luomus.fi/GJ.1987].

***Ischiodon scutellaris* (Fabricius, 1805)**
Figure 6

Scaeva scutellaris Fabricius, 1805: 252. Type-locality: India: Tamil Nadu, Tharangambadi. Syntypes, ZMUC.
Syrphus coromandelensis Macquart, 1842: 149. Type-locality: India: 'Cote de Coromandel'.
Sphaerophoria annulipes Macquart, 1855: 116. Type-locality: Marquesas Is.
Syrphus splendens Doleschall, 1856: 410. Type-locality: Indonesia: Java.
Syrphus nodalis Thomson, 1869: 497. Type-locality: French Polynesia: Society Is., Tahiti.
Syrphus erythropygus Bigot, 1884: 87. Type-locality: 'Indes'.
Syrphus ruficauda Bigot, 1884: 96. Type-locality: New Caledonia.
Melithreptus novaeguineae Kertesz, 1899: 178. Type-locality: Papua New Guinea: Astrolabe Bay, Erima.
Ischiodon trochanterica Sack, 1913: 6. Type-locality: Taiwan: Kanshizei, Puli as 'Polisha', Suihenkyaku, Tainan and Takao.
Melithreptus ogasawarensis Matsumura, 1916: 23. Type-locality: Japan: Bonin Is., Ogasawara-jima.
Ischiodon boninensis Matsumura, 1919: 128. Type-locality: Japan: Bonin Is., Chichijima, Ogasawara-jima.
Epistrophe platychiroides Frey, 1946: 164. Type-locality: Philippines: Luzon, Quezon, Atimonan.
Ischiodon penicillatus Hardy, 1952: 363; *nomen nudum*.
Epistrophe magnicornis Shiraki, 1963: 141. Type-locality: Micronesia: Chuuk State, Weno Is.
Sphaerophoria macquarti Goot, 1964: 220. New name for *annulipes* Macquart.

Differential diagnosis. Very widespread species with yellow abdominal marking reaching lateral margins (Fig. 6A, C). Males have the metatrochanters with a short calcar (Fig. 6E) and the claws in all legs are symmetrical. The pattern of tergite 2 in females is variable and cannot always be relied on to distinguish the females of *I. scutellaris* from those of *I. aegyptius*.

Geographical distribution. From Greece, eastwards to Caucasus, Kazakhstan, Iran, Arabian Peninsula south to Indomalayan region, China, Japan, Taiwan and Australasian and Oceanian regions except Hawaii. *I. scutellaris* has not been reported from Korea (Han and Choi 2001).

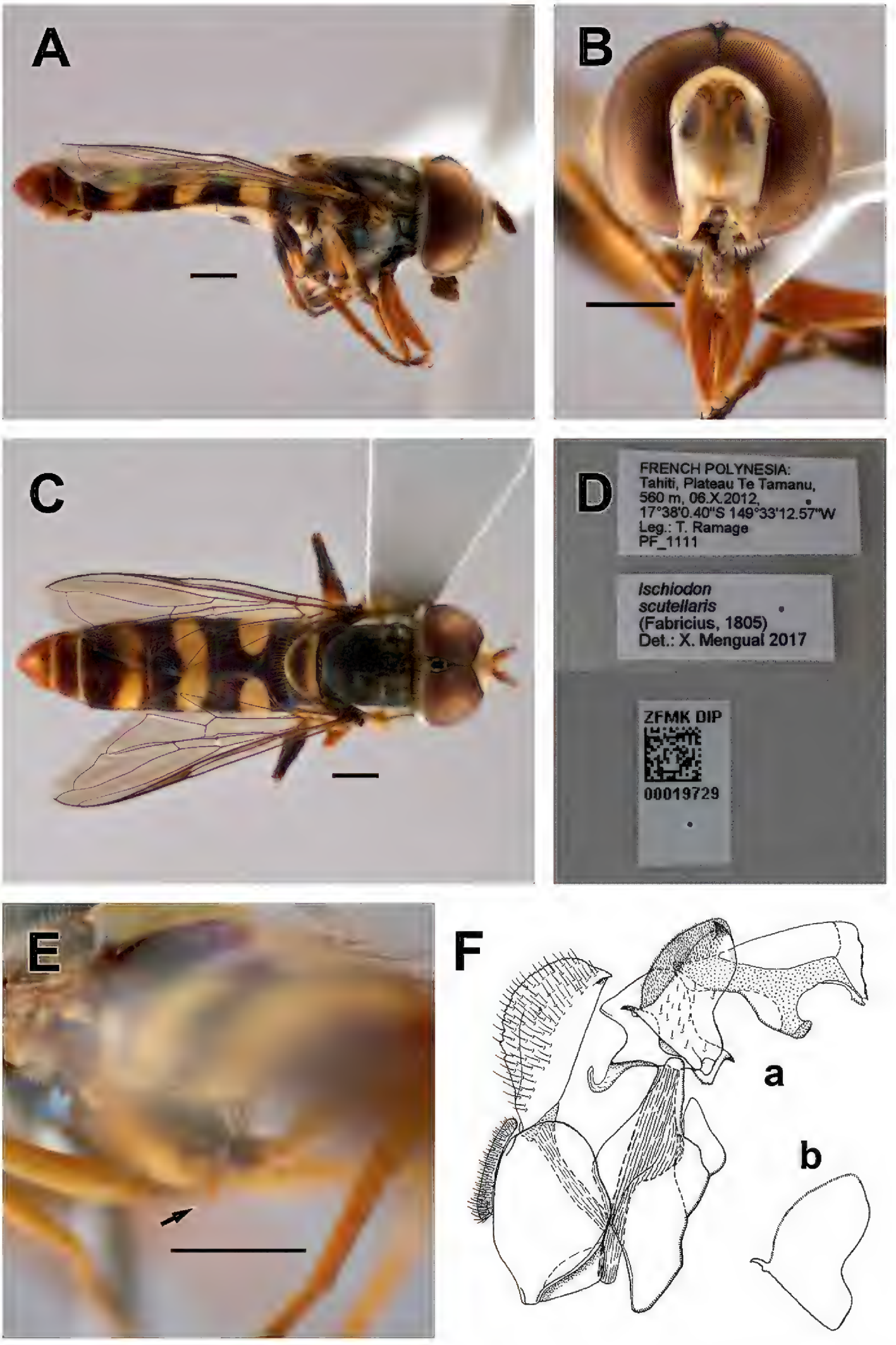

Figure 6. *Ischiodon scutellaris* (Fabricius), male ZFMK-DIP-00019729: **A** Habitus, lateral view **B** Frontal view **C** Habitus, dorsal view **D** Labels **E** Metacoxa and metatrochanter, posterolateral view **F** Male genitalia: **a** lateral view **b** postgonite, outline only (from Vockeroth 1969). Scale bars: 1 mm.

Material examined. More than 150 specimens from Greece, UAE, Kazakhstan, Iran, Nepal, Indonesia, Thailand, Taiwan, Australia, New Caledonia and French Polynesia. The syntypes of *Scaeva scutellaris* Fabricius, 1805 were not studied for the present study.

Remarks. In their excellent treatment of the flower fly fauna of the Arabian Peninsula, Smit et al. (2017) recorded *I. aegyptius* (as *Simosyrphus aegyptius*) from the UAE, Yemen and Socrota Is. and mentioned that the species was previously known from Saudi Arabia. Amongst the examined material, there are two males of *I. scutellaris* labelled as follows: UAE: Wadi Bih, dam, 25°48'N, 56°4.20'E, 4–13.i.2011, C. Schmid-Egger [1♂, CSCA; ZFMK-DIP-00026784]; Wadi Maidaq, 25°18.6'N, 56°7.8'E, 11–19.iii.2009, C. Schmid-Egger [1♂, CSCA; ZFMK-DIP-00026785]. These two males are the first records of *I. scutellaris* for the UAE and for the entire Arabian Peninsula.

Key to species of *Ischiodon* Sack, 1913

1 Males: eyes meeting on frons (Figs 1B, 2B, 5B, 6B) **2**

– Females: eyes separated (Fig. 3B, F) **5**

2 Metatrochanter without a calcar **3**

– Metatrochanter with a calcar (spur) (Figs 1E, 6E) **4**

3 Face entirely yellow (Fig. 2B). Tergite 2 with two broad, rounded yellow maculae; terga 3 and 4 mostly orange (Fig. 2A, C). Claws on all legs normal, symmetrical. Male genitalia: surstylus broadened beyond base with convex, dorsal margin; postgonite dorsally with two tips oriented anteriorly (Fig. 2E, F) (Madagascar) ..... ***astales* sp. n.**

– Face yellow with a medial black vitta (Fig. 5B). Terga 2–4 with small, oblique yellow maculae (Fig. 5A, C). Claws of fore leg asymmetrical: inner claw with a rounded flange dorsally, just before tip, in addition to pointed tip (Fig. 5F). Male genitalia: surstylus elongated, parallel-sided; postgonite dorsally with two lobes, the anterior (basal) lobe with two tips (Fig. 5G, H) (Cape Verde) ..... ***feae* (Bezzi)**

4 Calcar on metatrochanter long, more than three times longer than wide (Fig. 1E). Claws of fore leg asymmetrical: inner claw with a rounded flange or projection dorsally, just before tip, in addition to pointed tip (Fig. 5F). Male genitalia: surstylus trilobed, with dorsal margin convex; postgonite with a dorsal, very long, slightly curved process (Fig. 1F) (African continent and archipelagos, southern Europe, Israel, Arabian Peninsula) ..... ***aegyptius* (Wiedemann)**

– Calcar on metatrochanter shorter, about two times longer than wide (Fig. 6E). Claws on all legs normal, symmetrical. Male genitalia: surstylus broadened beyond base with convex, weakly serrate, dorsal margin; postgonite elongated with a broad base and a small process (Fig. 6F) (from Greece, Caucasus, Kazakhstan, Iran, Arabian Peninsula south to Indomalayan Region, Australasian and Oceanian regions, Japan)..... ***scutellaris* (Fabricius)**

5 Yellow abdominal maculae on terga 2 and 3 not reaching lateral margins (Fig. 3A, C, E) **6**

– Yellow abdominal maculae on terga 2 and 3 reaching lateral margins..... 7

6 Face entirely yellow (Fig. 3B). Abdomen dark anteriorly, but terga 3–6 reddish; tergite 2 with two large yellow maculae and terga 3 and 4 each with a yellow fascia (Fig. 3A, C) (Madagascar) ..... ***astales* sp. n.**

– Face yellow with a medial black vitta (Fig. 3F). Abdomen dark; terga 2–4 each with two oblique yellow maculae (Fig. 3E) (Cape Verde) ..... ***feae* (Bezzi)**

7 Typical female: tergite 2 usually with a transverse yellow fascia, sometimes with two yellow maculae with pointed inner margin (African continent and archipelagos, southern Europe, Israel, Arabian Peninsula) .... ***aegyptius* (Wiedemann)**

– Typical female: tergite 2 usually with two yellow maculae with rounded inner margin (from Greece, Caucasus, Kazakhstan, Iran, Arabian Peninsula south to Indomalayan Region, Australasian and Oceanian regions, Japan) .... ***scutellaris* (Fabricius)**

Note: Females of *I. aegyptius* and *I. scutellaris* cannot be distinguished as the pattern of tergite 2 is very variable. At this moment, conspecific males, DNA barcodes and/or collecting locality may help to distinguish them.

Discussion

A new species of *Ischiodon* is described from the southern regions of Madagascar. It should be noted that the male holotype and the four female paratypes of *I. astales* sp. n. were found amongst more than 200 specimens of *Ischiodon aegyptius* collected over several years (2002–2008) using Malaise traps (specimens deposited in the CAS). This might indicate the scarcity of this new species in nature, but the fact that *I. astales* has been collected in several habitats and at different elevations might indicate the opposite, i.e. the new species is more common than the number of specimens studied suggests.

Ischiodon scutellaris has reached the Mediterranean Basin and it is present in Greece, Crimea Peninsula and Turkey and might eventually reach northern areas of the Balkan Peninsula. In contrast, the species present in the Iberian Peninsula, Macaronesia, Italy, northern parts of the African continent, Cyprus and Israel is *I. aegyptius*. It seems that there is an overlapping area of these two species including the southern region of Turkey and Iran, where both species have been reported (Kazerani et al. 2013, Naderloo et al. 2013, Sarıbıyık 2014, Khosravian et al. 2015) and now also in the UAE. One is biased to think that the specimens of *I. scutellaris* collected in the UAE arrived from across the Persian Gulf or the Gulf of Oman, as there are no records of *I. scutellaris* from Iraq, Kuwait or Saudi Arabia. On the other hand, *I. scutellaris* might be present in these countries, but the lack of data makes any assumption difficult to corroborate as the syrphid fauna from these countries is poorly known.

Speight (2017) affirms that *I. aegyptius* is possibly a non-resident species in Europe, but it repeatedly establishes temporary populations that may, or may not, survive from one year to the next in Europe. Contrary to Speight (2017), the author believes that *I. aegyptius* and *I. scutellaris* are both resident species in Europe based on the number of continuous records and new evidence, as the habitats in the Mediterranean Basin between countries are not so different.

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Supplementary material 1

Table S1. Localities for the specimens of *Ischiodon astales* Mengual, sp. n. (Geographical coordinates)

Author: Ximo Mengual

Data type: occurence

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